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# Orbiter Composite Overwrapped Pressure Vessels

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# Orbiter Composite Overwrapped Pressure Vessels



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# Pressure Histories: Joint DOE/DuPont Study

Comment	Spool B 814133	Vessel #	Failure Time hr	Comment	Spool C 815123	Vessel #	Failure Time hr	Comment
1,416 to 1,563 1,450 to 1,822	1	11	1,495	2,261 to 2,763 3,150 to 3,653	Rank 1	13	964	1,400 to 2,137 3,122 to 3,624
	2	94	2,261		2	35	1,132	
	3	33	3,122		3	111	1,400	
	4	17	3,150		4	45	1,527	
	5	59	3,685		5	115	2,907	
	6	118	4,299		6	57	3,122	
	7	61	5,873		7	70	3,188	
	8	88	7,725		8	1	3,481	
	9	86	9,399					
Mean Spool B			4,557	Mean Spool C			2,215	
Std Dev			2,615	Std Dev			1,051	
CV (%)			57.4%	CV (%)			47.4%	
Median			3,685	Median			2,217	
Range Spool B			7,904	Range Spool C			2,517	
Range/Mean			1.73	Range/Mean			1.14	
Range/Median			2.14	Range/Median			1.14	
MinTime/Mean			0.33	MinTime/Mean			0.44	

# Pressure Histories: Joint DOE/DuPont Study

Comment	Spool E 889234	Vessel #	Failure Time hr	Comment	All Spools
3,644 to 4,056	Rank				
	1	117	418		
	2	119	1,404		
	3	32	1,790		
	4	34	2,304	2,304 to 2,448	
	5	120	3,213		
	6	114	3,412		
	7	5	3,600		
	8	116	4,195		
	9	43	4,336		
	10	110	6,650		
	Mean Spool E		3,132		Mean (All) 2,856
	Std Dev		1,767		Std Dev 2,056
	CV (%)		56.4%		CV (%) 72.0%
	Median		3,313		Median 2,304
	Range Spool E		6,232		Range (All) 8,981
	Range/Mean		1.99		Range/Mean 3.14
	Range/Median		1.88		Range/Median 3.90
	MinTime/Mean		0.13		MinTime/Mean 0.15

# Pressure Histories: 3,380 psi vessels

Rank	Vessel #	Spool	Time to Failure, hr	Time to Failure, yr	Comment	Date(s) of Failure	Check Failure, hr
1	204	7	3,960	0.45	Used Lower Failure Time		
2	218	7	5,376	0.61			
3	163	6	7,320	0.84			
4	95	3	8,615	0.98			
5	142	5	9,120	1.04			
6	68	2	14,440	1.65			
7	180	6	16,104	1.84			
8	155	5	20,231	2.31			
9	171	6	20,233	2.31			
10	134	5	35,880	4.10			
11	228	8	48,048	5.48	All Vessels filled 6-27-77	12/21/86	48,048
12	250	8	52,848	6.03		7/9/87	52,848
13	3	1	57,816	6.60	57,816<Failure<64,824	1-31-84 to 11-19-84	57,816
14	116	1	57,816	6.60	57,816<Failure<64,824	1-31-84 to 11-19-84	57,816
15	106	4	57,816	6.60	57,816<Failure<64,824	1-31-84 to 11-19-84	57,816
16	27	1	75,624	8.63	75,624<Failure<75,984	2-11-86 to 2-26-86	75,624
17	111	4	87,760	10.02	87,760<Failure<89,448	5-21-87 to 9-10-87	86,760
18	127	4	87,760	10.02	87,760<Failure<89,448	5-21-87 to 9-10-87	86,760
19	224	8	90,696	10.35	90,696<Failure<92,904	11-87 to 2-88	90,696
20	18	1	94,344	10.77	Not Failed as of 4/88		94,344
21	117	4	94,344	10.77	Not Failed as of 4/88		94,344



# Pressure Histories: 3,380 psi vessels

Statistics	hours	years	
Mean (All)	45,055	5.14	Used Lower Failure Time In Each Case
Std Dev	33,526	3.83	
CV (%)	74.41	74.41	
Median	48,048	5.48	21 Total Vessels 19 Failed
Range (All)	90,384	10.32	
Range/Mean	2.01	2.01	
Min time/Mean	0.09		
Mean w/o #7	49,306	5.63	Used Lower Failure Time In Each Case
Std Dev	32,381	3.70	
CV (%)	65.67	65.67	
Median	52,848	6.03	
Range w/o #7	87,024	9.93	
Range/Mean	1.76	1.76	
Min time/Mean	0.15		
Mean 2,3,5,6	16,493	1.88	8 Total Vessels All Failed
Std Dev	9,325	1.06	
CV (%)	56.54	56.54	
Median	15,272	1.74	
Range 2,3,5,8	28,560	3.26	
Range/Mean	1.73	1.73	
Min time/Mean	0.44		
Mean 1,4,8	73,170	8.35	11 Total Vessels 9 Failed 2 Intact After 10.77 years
Std Dev	18,404	2.10	
CV (%)	25.15	25.15	
Median	75,624	8.63	
Range 1,4,8	46,296	5.28	
Range/Mean	0.63	0.63	
Min time/Mean	0.66		

